6.147 Comment 147

RFI Section: 9.3
Comment Letter Page: 18

Background locations shall be clearly identified. While the text infers locations SED 9, 10 and 16 are background locations, it is unclear whether there are others (i.e., SED 11). The range of background data from the Woodbridge and Spa Springs Creeks should be compared to the range of site related data in those Creeks. The range of background data from the Arthur Kill should be compared with the range of site-related data from the Kill.

Chevron Response

The background BEE sediment and surface water sample locations in Section 9.0 of the RFI are shown in Table 70.

Table 70. BEE Sample Locations

Water Body	Background Sample
Spa Spring Creek	SED 11
Woodbridge Creek	SED 09 and 10
Arthur Kill	SED 16 and 17

The original sediment data tables and figures were included in the December 2003 RFI report. As requested by the NJDEP, the range of data from the background locations was compared to the range of data from samples collected adjacent to Chevron (i.e., near-site data). A list of the samples included in the "background" and "near-site" data groupings is provided in Table 71; the summary of background and near-site data ranges are provided on Table 72 through Table 74. A simple comparison of these data demonstrates that many of the sediment constituents of potential environmental concern (COPECs) are present in background sediments, with some at relatively high concentrations. It should be noted that sediments are often semi-transient, exhibiting complex, episodic transport-depostion-resuspension dynamics. Thus, the quantitative presence of contaminants (i.e., concentrations) may be of less importance than the qualitative presence (i.e., list of contaminants) in evaluation of background conditions.

Collection and analysis of additional background sediment samples and integration of regional investigations by others will be included in subsequent investigations to the BEE as discussed in Chevron's response to Comment 5.

Table 71. BEE Background and Near-Site Data Groupings

Arthur Kill		Spa Spring Creek		Woodbridge Creek	
Background Samples	**Near-Site Samples**	**Background Samples**	***Near-Site Samples***	**Background Samples**	**Near-Site Samples**
SED-16-C/6-12	SED-13-C/6-12	SED-11-C/6-12	SED-08-A/6-12	SED-10-A/6-12	SED-06-A/6-12
SED-17-C/6-12	SED-13-C/6-12D		SED-08-C/6-12	SED-10-B/6-12	SED-06-B/6-12
	SED-14-C/6-12		SED-07-A/6-12	SED-10-C/6-12	SED-06-C/6-12
	SED-18-C/6-12		SED-07-B/6-12	SED-09-A/6-12	SED-05-A/6-12
	SED-15-C/6-12		SED-07-C/6-12	SED-09-B/6-12	SED-05-B/6-12
				SED-09-C/6-12	SED-05-C/6-12
				SED-09-C/33-39	SED-04-A/6-12
					SED-04-A/39-45
					SED-04-B/6-12
					SED-04-C/6-12
					SED-03-A/6-12
					SED-03-B/6-12
					SED-03-C/6-12
					SED-03-C/12-18
					SED-03-C/30-36
					SED-02-A/6-12
					SED-02-B/6-12
					SED-02-B/6-12D
					SED-02-C/6-12
					SED-01-A/6-12
					SED-01-B/6-12
					SED-01-C/6-12

Table 72. Arthur Kill Background Comparisons

Contaminant of Concern	Near-Site Sample Range	Background Sample Range	No. Samples > Background /No. Samples	ER-L	No. Samples > ER-L/ No. Samples	ER-M	No. Samples > ER-M/ No. Samples
2-Methylnaphthalene	0.064 - 0.085	0.065 - 0.67	0/5	0.07	1/5	0.67	0/5
Acenaphthylene	0.12 - 0.15	0.15 - 0.59	0/5	0.044	5/5	0.64	0/5
Acenaphthene	0.04 - 0.46	0.027 - 3.9	0/5	0.016	5/5	0.5	0/5
Fluorene	0.053 - 0.21	0.05 - 1.2	0/5	0.019	5/5	0.54	0/5
Phenanthrene	0.28 - 0.36	0.2 - 2.2	0/5	0.24	5/5	1.5	0/5
Anthracene	0.26 - 0.31	0.25 - 2.4	0/5	0.085	5/5	1.1	0/5
Fluoranthene	0.18 - 1.3	1 - 6.4	0/5	0.6	4/5	5.1	0/5
Pyrene	0.24 - 1.6	1.3 - 7.3	0/5	0.665	4/5	2.6	0/5
Benzo(a)anthracene	0.52 - 0.65	0.44 - 3.7	0/5	0.261	5/5	1.6	0/5
Chrysene	0.59 - 0.94	0.7 - 3.8	0/5	0.384	5/5	2.8	0/5
Benzo(k)fluoranthene	0.26 - 0.44	0.33 - 1.2	0/5	0.24	5/5	1340	0/5
Benzo(a)pyrene	0.6 - 0.85	0.65 - 3.2	0/5	0.43	5/5	1.6	0/5
Indeno(1,2,3-cd)pyrene	0.3 - 0.64	0.36 - 1.6	0/5	0.2	5/5	320	0/5
Dibenzo(a,h)anthracene	0.084 - 0.15	0.094 - 0.47	0/5	0.063	5/5	0.26	0/5
Benzo(g,h,i)perylene	0.26 - 0.63	0.33 - 1.7	0/5	0.17	5/5	320	0/5
Total PAHs	4.4 - 9.2	7 - 45	0/5	4	5/5	45	0/5
Arsenic	28.3 - 35.8	46.7 - 107	0/5	8.2	5/5	70	0/5
Cadmium	2.2 - 2.6	2.3 - 5.9	0/5	1.2	5/5	9.6	0/5
Chromium	116 - 134	140 - 198	0/5	81	5/5	370	0/5
Copper	257 - 302	413 - 587	0/5	34	5/5	270	2/5
Lead	194 - 230	291 - 322	0/5	47	5/5	218	1/5
Mercury	2.4 - 3.2	2.6 - 7	0/5	0.15	5/5	0.71	5/5
Nickel	45.1 - 52.3	59.7 - 64.3	0/5	21	5/5	52	1/5
Silver	4.2 - 5.2	2.4 - 7.9	0/5	1	5/5	3.7	5/5

Table 72. Arthur Kill Background Comparisons

Contaminant of Concern	Near-Site Sample Range	Background Sample Range	No. Samples > Background /No. Samples	ER-L	No. Samples > ER-L/ No. Samples	ER-M	No. Samples > ER-M/ No. Samples
Zinc	361 - 393	405 - 617	0/5	150	5/5	410	0/5

Concentrations shown in parts per million.
ER-L = Effects Range – Low (NJDEP Guidance for Sediment Quality Evaluation).
ER-M = Effects Range – Medium (NJDEP Guidance for Sediment Quality Evaluation).

Table 73. Woodbridge Creek Background Comparisons

Contaminant of Concern	Near-Site Sample Range	Background Sample Range	No. Samples > Background /No. Samples	ER-L	No. Samples > ER-L/ No. Samples	ER-M	No. Samples > ER-M/ No. Samples
Benzene	<0.13 - 20	<0.15 - 3	3/22	0.34	3/22	--	--
Toluene	<0.13 - 2.9	<0.15 - 1.1	1/22	2.5	1/22	--	--
Ethylbenzene	<0.13 - 5.5	<0.15 - 6.6	0/22	1.4	2/22	--	--
Xylenes	<0.13 - 27	<0.15 - 29	0/22	0.12	4/22	--	--
Naphthalene	0.0041 - 10	0.0018 - 2.9	2/22	0.16	4/22	2.1	2/22
2-Methylnaphthalene	0.0034 - 39	0.0009 - 10	1/22	0.07	4/22	0.67	3/22
Acenaphthylene	0.0012 - 1.2	0.0049 - 0.49	2/22	0.044	16/22	0.64	2/22
Acenaphthene	0.0015 - 2.8	0.0008 - 0.94	2/22	0.016	16/22	0.5	3/22
Fluorene	0.003 - 5.8	0.0012 - 1.9	2/22	0.019	16/22	0.54	3/22
Phenanthrene	0.011 - 11	0.011 - 9.1	2/22	0.24	14/22	1.5	6/22
Anthracene	0.003 - 1.3	0.017 - 1.6	0/22	0.085	17/22	1.1	3/22
Fluoranthene	0.021 - 4.8	0.12 - 2.7	4/22	0.6	17/22	5.1	0/22
Pyrene	0.027 - 8.6	0.24 - 6.5	1/22	0.665	18/22	2.6	8/22
Benzo(a)anthracene	0.0081 - 3.9	0.14 - 3.3	1/22	0.261	17/22	1.6	4/22
Chrysene	0.011 - 7.5	0.14 - 5.5	1/22	0.384	16/22	2.8	3/22
Benzo(k)fluoranthene	0.0056 - 1.3	0.087 - 0.95	3/22	0.24	14/22	1340	0/22
Benzo(a)pyrene	0.01 - 8.5	0.19 - 6.3	1/22	0.43	15/22	1.6	4/22
Indeno(1,2,3-cd)pyrene	0.0076 - 3.6	0.095 - 2.1	1/22	0.2	16/22	320	0/22
Dibenzo(a,h)anthracene	0.0018 - 3.1	0.026 - 2	1/22	0.063	16/22	0.26	7/22
Benzo(g,h,i)perylene	0.011 - 14	0.095 - 9.1	1/22	0.17	19/22	320	0/22
Total PAHs	0.15 - 91	1.4 - 69	2/22	4	18/22	45	2/22
Antimony	<0.88 - 2.9	<0.85 - 7.9	0/22	2*	3/22	25*	0/22
Arsenic	6.2 - 91.7	4.7 - 64.5	2/22	8.2	20/22	70	1/22
Cadmium	0.68 - 13	0.24 - 13	0/22	1.2	15/22	9.6	2/22

Table 73. Woodbridge Creek Background Comparisons

Contaminant of Concern	Near-Site Sample Range	Background Sample Range	No. Samples > Background /No. Samples	ER-L	No. Samples > ER-L/ No. Samples	ER-M	No. Samples > ER-M/ No. Samples
Chromium	20.5 - 166	11.6 - 126	3/22	81	7/22	370	0/22
Copper	17.7 - 8030	47.3 - 572	8/22	34	21/22	270	14/22
Lead	13.5 - 399	35 - 399	0/22	47	20/22	218	8/22
Mercury	0.03 - 5.8	<0.012 - 4	3/22	0.15	18/22	0.71	11/22
Nickel	28.6 - 2480	28.8 - 290	2/22	21	22/22	52	14/22
Silver	<0.2 - 5.4	<0.12 - 3.6	7/22	1	12/22	3.7	6/22
Zinc	88.9 - 2970	184 - 775	1/22	150	19/22	410	11/22

Concentrations shown in parts per million.
ER-L = Effects Range - Low (NJDEP Guidance for Sediment Quality Evaluation).
ER-M = Effects Range - Medium (NJDEP Guidance for Sediment Quality Evaluation).
*Screening value as provided by the National Oceanic and Atmospheric Administration's Screening Quick Reference Tables.

Table 74. Spa Spring Creek Background Comparisons

Contaminant of Concern	Near-Site Sample Range	Background Sample Range	No. Samples Background /No. Samples	ER-L	No. Samples ER-L/ No. Samples	ER-M	No. Samples ER-M/ No. Samples
Acenaphthylene	<0.0024 - 0.083	<0.0049	1/5	0.044	1/5	0.64	0/5
Acenaphthene	<0.013 - 0.017	<0.0049	1/5	0.016	1/5	0.5	0/5
Fluorene	<0.013 - 0.031	0.0059	1/5	0.019	1/5	0.54	0/5
Phenanthrene	0.018 - 0.31	0.011	1/5	0.24	1/5	1.5	0/5
Anthracene	<0.013 - 0.13	<0.0049	1/5	0.085	1/5	1.1	0/5
Benzo(a)anthracene	<0.013 - 0.29	0.0097	1/5	0.261	1/5	1.6	0/5
Chrysene	0.017 - 0.39	0.011	1/5	0.384	1/5	2.8	0/5
Benzo(a)pyrene	<0.013 - 0.45	0.0061	1/5	0.43	1/5	1.6	0/5
Indeno(1,2,3-cd)pyrene	<0.014 - 0.37	0.0058	1/5	0.2	1/5	320	0/5
Dibenzo(a,h)anthracene	<0.013 - 0.15	<0.0049	1/5	0.063	1/5	0.26	0/5
Benzo(g,h,i)perylene	<0.013 - 0.74	<0.0049	2/5	0.17	2/5	320	0/5
Total PAHs	0.135 - 4.891	0.1	5/5	4	1/5	45	0/5
Antimony	<3.4 - 5.8	<1.7	1/5	2	1/5	25	0/5
Arsenic	6.2 - 164	10	3/5	8.2	4/5	70	1/5
Cadmium	0.31 - 2.5	1.6	1/5	1.2	2/5	9.6	0/5
Chromium	15 - 133	37.7	1/5	81	1/5	370	0/5
Copper	8.2 - 494	23.4	2/5	34	2/5	270	1/5
Lead	7.7 - 656	22.7	1/5	47	1/5	218	1/5
Mercury	0.048 - 2.6	<0.026	1/5	0.15	1/5	0.71	1/5
Nickel	17 - 85.1	32.9	3/5	21	4/5	52	2/5
Silver	0.48 - 2.1	<0.24	1/5	1	1/5	3.7	0/5
Zinc	58.4 - 1140	106	2/5	150	2/5	410	2/5

Concentrations shown in parts per million.
ER-L = Effects Range - Low (NJDEP Guidance for Sediment Quality Evaluation).
ER-M = Effects Range - Medium (NJDEP Guidance for Sediment Quality Evaluation).

6.148 Comment 148

RFI Section: 9.3
Comment Letter Page: 18

Frequency of detection should not be used to cull potential COCs, since "hot spot" areas may be present and require further evaluation. For example, the significance of BTEX contamination in sediments is diminished, based on "low frequency", yet the ppm-levels exceed screening criteria by two orders of magnitude and these contaminants were identified as site-related in Table 9-2. Further investigation with a more sensitive sampling technique (i.e., diffusion bag samplers) may be warranted. Another example is the elimination of copper from further concern in sediments based on low frequency of detection in soils, even though copper is elevated in 37/42 sediment samples and severely elevated in several (see comment below). Chevron shall reexamine all data and reinstate potential COCs that were culled based on frequency of detection as appropriate.

Chevron Response

Review of analytical detection frequency is a valuable and necessary data evaluation tool; however, frequency of detection alone was not used to cull potential COPECs in the BEE. The NJDEP's concern regarding hot-spots appears exaggerated by referring to "BTEX" as "exceeding the screening criteria by two orders of magnitude". Actually, only one of the BTEX compounds, xylene, was detected at that level. Benzene was near, but less than two orders of magnitude above the criterion. Ethylbenzene was much less than half of an order of magnitude above the criterion and toluene was only slightly over the criterion in only one sample. It should be noted that benzene and xylene were not culled from the list, but were included in the list of COPECs identified by the BEE, and carried through the BEE process including evaluation of migration pathways. The NJDEP inappropriately groups these compounds together and implies, by using them as an example, that constituents were culled from the list of COPECs by mere consideration of detection frequency alone.

The NJDEP offers copper as another example of how low frequency of detection should not be used to cull COPECs. Again, frequency of detection alone was not used to cull potential COPECs in the BEE. In the case of copper, there were several reasons given, in addition to the low detection frequency in on-site soils, to support culling this element from the list of COPECs, including its absence in groundwater, presence in background sediment samples, and significant off-site sources that likely contributed copper and other COPECs detected in the sediments and surface water. Also, the NJDEP references the high copper detection frequency and high concentrations in sediments. However, it should be noted that just because the copper is elevated and frequently detected in sediments, does not demonstrate a causal link to soils at Chevron. This is especially true when the copper data in on-site soils exhibits such a low frequency of detection above the copper soil criterion, there are no migration pathways for copper translocation from on-site soils to the water body sediments, and when there are other more significant potential sources of copper along the stream reach.

Notwithstanding the above response, the constituents culled from the list of COPECs based in part on low detection frequency will be compared to COCs in potential on-site source areas and potential migration pathways, and reinstated only if warranted and as appropriate.

The results of this re-evaluation will be included in a Supplemental Ecological Evaluation Report. Chevron is proposing to defer the submittal of the Supplemental Ecological Report pending obtaining additional groundwater quality from the on-site monitoring well network and incorporate additional soils data generated from the Corrective Measures Study. This will provide Chevron with a more rigorous data base from which to identify COCs.

6.149 Comment 149

RFI Section: 9.3.6
Comment Letter Page: 19

Nine contaminants were retained as COPECs (antimony, arsenic, lead, nickel, benzo(a)anthracene, benzo(a)pyrene, benzo(b)flouranthene, benzene and xylenes in sediment and nickel in surface water). The list was culled further in Section 9.5.4, Conclusions and Recommendations, to a formal general recommendation for further evaluation of SVOCs and metal COPECs in the Woodbridge Creek". These conclusions must be revised after data are reexamined pursuant to the NJDEP's comment above. In addition, this section should be revised to highlight inorganic "hot spots", especially copper and zinc at location SED 3C and SED 5C. These contaminants were identified as site-related (as per Table 9-2). Copper is 200 times the ERL and zinc is 20 times the ERL at location SED 5C, and both are elevated above the range of background data. These levels are of concern from the standpoint of direct exposure as well as a potential source to downstream sediments. Similarly, total PAR levels at SED 3C are elevated relative to other site related and background locations, and shall be specifically addressed. The list of COPECs that will be retained should be revised pursuant to this comment and the NJDEP comment above, and clearly provided in this section.

Chevron Response

The NJDEP's reference to copper and zinc being identified as "site-related" is taken out of context with the overall evaluation. Table 9-2 included an initial list of COPECs, and does not represent the final COPEC list developed at the conclusion of the COPEC review. Later in Section 9.3.6 of the RFI, where conclusions are provided after review of all the data, copper and zinc are not included in the list of potentially site-related COPECs. The COPECs must be qualified as "potentially site-related" because, although both metals are found in the off-site sediments and in on-site soils, there is no migration pathway established and there are many other sources for these elements in the sediment. In fact, the data do not provide a basis to conclude that copper and zinc in the water body sediments are in any way site-related; all of the metals in sediments may derive entirely from other sources. The BEE identifies several such sources, a number of which represent significant potential sources for COPECs - especially metals that are present in the sediment.

Notwithstanding the above response, the conclusions regarding COPECs will be revised pursuant to the re-evaluation described in the response to Comment 148 above. The data evaluation will also include a review of the inorganic "hot spots" focused on copper and zinc, and total PAH concentrations in sediments. These revisions will be incorporated in subsequent investigations to the BEE as discussed in Chevron's response to Comment 5.

6.150 Comment 150

RFI Section: 9.3.6
Comment Letter Page: 19

Review of Figures 9-6, 9-7 and 9-8 indicate visible staining at all six sample locations in the Woodbridge Creek and reference location SED 9. The conclusions of the COC section should highlight the need for further investigation of sediment cores where staining and petroleum odors were identified. This shall be addressed pursuant to N.J.A.C. 7:26E-6.1(d) whereby Chevron is responsible for remediation of free and/or residual petroleum product, or containment when treatment or removal are not practicable, regardless of depth, the presence/absence of product shall be determined by methods identified in N.J.A.C. 7:26E-2.1(a)11. This section of the regulation includes methodologies such as ultraviolet flourescence, soil-water agitation procedures, centrifuging and hydrophobic dye testing, gross observations such as visual staining, sheens, droplets, squirting NAPL, odors etc. are important additional information. As an aid to delineation of product, the NJDEP typically requires performance of Total Petroleum Hydrocarbon (TPHC) analysis via method NJDEP OQA-QAM-025-10/01 (Revision 5) or EPA method 418.1 and recommends sediments with TPHC results >3000 ppm to be investigated for product as in 2.1(a)11 above. The TPHC method shall use a standard capable of quantifying both aliphatic and aromatic hydrocarbons.

Chevron Response

Subsequent investigations to the BEE as discussed in Chevron's response to Comment 5 will include details for further investigation of the staining and petroleum odors reported in many sample locations in Woodbridge Creek. The investigation will be conducted using TPHC analysis by Method NJDEP OQA-QAM-025-10/01 (latest NJDEP approved revision) and a soil-water agitation procedure for free and/or residual product for samples containing TPHCs greater than 3,000 ppm. The investigation will include sediments from background and near-site sampling locations.

6.151 Comment 151

RFI Section: 9.4
Comment Letter Page: 19

The existence of the storm water network notwithstanding, if more detailed information is available, or a historic migration path was likely, to link specific SWMUs/AOCs with contaminants found in surface water bodies, it should be provided (i.e., historic soil runoff prior to emplacement of the storm water system, flood events or historic direct discharges etc.). Lack of information regarding operations/potential contaminant migration from the North Field Extension must be identified as a data gap.

Chevron Response

The observed metals and petroleum-related substances are not associated with active discharges or migration pathways, based on inspections and groundwater data from monitoring wells located along the Woodbridge Creek. Historical site data was used to guide development of the sediment and surface water sampling plan. It should be noted that the sediment transects and surface water locations described in the BEE were provided to the NJDEP prior to sample collection, and the sampling locations and overall plan was discussed and approved during a meeting with the NJDEP prior to sample collection. The sampling plan and precursory discussions with the NJDEP included historical migration pathways (e.g., historical aerial photographs) that formed the basis for the selection of transect locations. Therefore, Chevron believes that the investigation adequately considered the historical migration pathways. There is no additional historical information other than what has been used already to evaluate potential migration pathways.

Also, as noted in the previous discussion of Comment 1, the NFE was never included in Chevron's Refinery operations and was not included within the scope of the RFI Report; ecological evaluation of the NFE is addressed in the March 1, 2005 RIR (Roux, 2005).

Notwithstanding the above responses, the sediment data will be re-evaluated to identify any potential historical links to SWMUs/AOCs and the list of COPECs will be updated if necessary. Also, the 2005 RIR will be reviewed, and pertinent data and findings will be summarized in the context of Chevron's BEE. A summary of the historical review and review of the 2005 RIR will be included in subsequent investigations to the BEE as discussed in Chevron's response to Comment 5.

6.152 Comment 152

RFI Section: 9.5.4
Comment Letter Page: 19

This section shall identify data gaps that will by addressed in the future evaluations, (i.e., need for data from areas of intertidal estuarine wetlands identified on pg. 333 and Figure 9-3). The need for characterization of the North Field Extension should be highlighted, since numerous creeks/ditches discharging to the Woodbridge Creek are indicated on Figures 9-6, 9-7 and 9-8. The need for further investigation of sediment locations exhibiting sheen and odors, per the NJDEP comments above must be indicated.

Chevron Response

As noted in the RFI Report, additional ecological evaluation is recommended for selected COPECs in Woodbridge Creek sediments. Data gaps that will be addressed in future investigations include, TPHC analysis of sediment samples (as described in Comment 150 above) and further investigation of sediment COPECs in background and hot-spot areas, including sediments in adjacent intertidal wetland areas. The list of COPECs to be included as part of the future investigations will be revised to include constituents, as appropriate, based on the additional data review as described above. The data gaps will be summarized and addressed.

6.153 Comment 153

RFI Section: 9.5.4
Comment Letter Page: 19

Chevron should be aware that the NJDEP concurs with the conclusion to further evaluate Woodbridge Creek, however Spa Spring Creek and the North Field Extension must also be included. In addition to the "SVOC and metal COPECs" identified for further evaluation in Section 9.5.4, the NJDEP recommends that the analyses include BTEX compounds, TPHC and a more comprehensive list of metals. The BEE should be revised per the above comments.

Chevron Response

Based on the NJDEP's comment, the NJDEP agrees with the December 2003 RFI Report recommendation for further evaluation of Woodbridge Creek sediments. However, the requirement to include Spa Spring Creek and the NFE needs clarification. One of the technical reasons for not including VOCs in future sediment sampling was that BTEX compounds were only detected above Sediment Screening Guidelines (SSGs) in Woodbridge Creek sediments. Thus, additional evaluation of VOCs in Spa Spring Creek is not warranted.